

BOOK REVIEWS

BEVERTON, RAYMOND J. H., AND SIDNEY J. HOLT. 1957. *On the Dynamics of Exploited Fish Populations*. Gt. Britain, Fishery Invest., Ser. II, Vol. XIX. 533 pp. 126/- (= U. S. \$17.61).

It is brash to attempt to review in short compass a 533-page book which the authors have themselves required 8 pages to summarize. I have met both authors, and Sidney Holt was our biometrics instructor in a six-weeks FAO course which I conducted in Istanbul in 1953. They have done a truly stupendous and painstaking job in producing a monograph on population dynamics which will enhance the meaning of fishery dynamics for a long period. It should prove equally useful to biometricians studying other organisms.

Any comments which I make in the invidious role of a critic are not meant to detract from the value of a work that belongs on the shelf of any serious student of the subject. For the average biologist the very multiplicity of formulae—the count is 419 formally numbered formulae plus divers minor formulae—is too formidable to cope with. The number of formulae is further complicated by radical departure from the simplicity of R. A. Fisher. The authors list 120 different symbols, 12 of which are used with two meanings and 2 with three meanings. The extensive references throughout the text to previous sections of the book makes reading laborious.

The classical approach in fisheries has been from the actual to the theoretical. The authors have reversed this at times using a highly theoretical and purely mathematical approach. It is too soon to form a competent judgment of the results. For demersal fisheries the authors have been able in many instances to find data which support their formulae. It must here be pointed out, however, that some of the assumptions which apply to these relatively simple cases may often fail when applied to pelagic or anadromous species.

The chief shortcoming of the theoretical approach is the necessity for always making a number of assumptions. Only rarely does one find all of these assumptions satisfied in any set of actual field data. Granted that theory may sometimes enable revision of data collecting methods so as to satisfy some assumption, yet the biologist must make decisions now based on the data available.

The case which the authors attempt to make for "permanent self-induced oscillations in population abundance" (p. 57) for populations with a dome-shaped reproductive curve having a steep right limb, while possibly mathematically sound, must be based on a stable environment. Since such an environment is practically non-existent the correctness of this theory must await corroboration.

The authors were evidently unaware of the occasional deaths of millions of marine fish in the Laguna Madre of Texas reported by Gunter,

Hedgpeth and others (footnote on p. 68), from excessively high salinities.

In developing the formulae for fishing mortality (pp. 89-91) the assumption is made that by taking a small enough unit of time the natural mortality occurring simultaneously can be ignored. This could as well be stated in reverse.

Owing undoubtedly to the authors' familiarity with year-round demersal fisheries the sections on gear saturation and seasonal variation in fishing (pp. 94-95) are disappointingly brief and offer no adequate solutions for analyzing the types of data usually available for determining abundance in anadromous and many pelagic fisheries.

In developing methods for standardizing fishing effort the authors claim a linear relation between gross tonnage and the power factor of trawlers; yet the linear curves shown (p. 173) should obviously be curvilinear. The reverse is true of the length versus power factor curve on p. 176. This effort to use only proportional linear curves is understandable since it permits easier use of the British trawl statistics which give hours of trawling per gross ton-hour. However, there is little mention of age of vessels as an important factor of gear efficiency in these fisheries.

In selecting examples to illustrate the derivation of the natural mortality coefficient the authors chose data from the Fraser River sockeye fisheries (Rounsefell, 1949, *Biometrics*, 5:2). Unfortunately, the coefficient which they arrive at "residual fishing during the period as well as true natural mortality" does not contain natural mortality. The escapement of salmon in the example was derived from the gillnet catches assuming the absence of natural mortality. The very high coefficient they show is due entirely to fishing by other gears.

In discussing the relation between potential egg production and recruitment the authors have used throughout the text a curve approaching an upper asymptote. They cite a few examples to show that this type of reproductive curve not only applies to marine fishes but also applies to salmon. They thus dismiss the theoretical interpretation of a dome-shaped reproductive curve for salmon as postulated by Ricker [1954, *Fish and Recruitment*, J. Fish. Res. Bd. Canada 11(5)]. In the only example for salmon containing over 7 years of data the authors used the Fraser River sockeye, the runs of which are composed of several distinct races that merely use the river as a means of ingress and egress from their individual lake systems. Full confirmation of Ricker's hypothesis has since been shown using 59 years of data for the Karluk River sockeye (Rounsefell, 1958, *Bull. U. S. Fish and Wildlife Service*, 58(130)).

The use of multitudinous symbols with tiny subscripts makes use of a reading lens almost necessary. No distinction is clearly made between formulae that have been corroborated by adequate field data and those which are purely theoretical concepts. Perhaps the most noticeable omission is the failure to include tests of significance.

MOORE, HILARY B. 1958. *Marine Ecology*. John Wiley & Sons, Inc., New York. 493 pp. \$9.50.

Oceanography embraces study of all aspects of the sea. Marine ecology, the science of interactions between living marine organisms and their environment, draws upon several branches of oceanography (for environmental factors) and in addition includes study of individuals and species (autecology) and—the unique aspect of the science—of groups of marine organisms associated together as populations, communities, and ecosystems (synecology). The magnitude of the task of synthesis of knowledge in marine ecology in the form of a text for student use is indicated by the substantial three dimensional geographic domain encompassed by, the large number and complexity of interrelated functional units in, and the incompleteness of knowledge in many areas of the field.

Such a text has been attempted by Hilary B. Moore in *Marine Ecology*. The author expresses his concept of ecology and describes the content of his book as follows (p. 16): "A survey of the present status of ecological knowledge cannot be made to fit into a concise and orderly pattern and would, in fact, suffer if so limited. There is too much interconnection of effects. In succeeding chapters, the various ecological factors are considered in turn, and examples are given of the ways in which they have been found to affect different organisms. After this an account is given of the more important types of environments, together with an outline of the variations and significance of the various factors in each. These environments range from the comparatively stable and simple abyssal regions to the highly complex intertidal zone. Finally, these environments are considered in terms of the organisms inhabiting them with a discussion of the present status of knowledge of typical groups."

The book possesses an attractive format and is enhanced by 214 illustrations and 71 tables. It contains 26 pages of references, principally in English (the choice was deliberate to meet needs of English-speaking students), which represent a thorough search of the literature. The text introduces a classification of plants and animals designed to facilitate the placing of unfamiliar groups in appropriate taxa. This is helpful since the author draws examples from marine areas in many different parts of the earth.

The volume strongly stresses environmental

In summary, this book is a veritable gold mine of information for biometricians interested in population dynamics. Although the reviewer may disagree on a few points, this in nowise detracts from the overall value of this exhaustive treatise.

GEORGE A. ROUNSEFELL

U. S. Fish and Wildlife Service
Galveston, Texas

John Wiley & Sons, Inc., New York. 493

ecology, autecology, and habitat ecology. Eighty-two pages provide good coverage of physical and chemical environmental factors. The next 24 pages are devoted to "biological environmental factors" and cover the topics: food, crowding, dispersal, predation, and interaction of multiple factors. The subject of "dispersal," however, does not fit smoothly in a framework of "biological environmental factors." A description of major habitats occupies the following 81 pages. Penetration of light in the upper oceanic zone is well treated, but discussion of the physical characteristics of estuaries conspicuously omits such aspects of circulation as non-tidal flow and the significance of this to planktonic larvae of estuarine organisms. A lengthy explanation (pp. 195-8) on the "effect of . . . salinity distribution on the variations in optimum levels of various types of organisms in an estuary" is not clear. Two pages of discussion of pollution (the only treatment of the subject in the text) are appended to the section on salinity in the estuary; since pollution is not restricted to estuaries, it might better be treated in a separate section. In view of the significance of salt marshes and mangroves, it is unfortunate that so little space is devoted to their habitats. The next 204 pages cover organisms by habitats. The best sections are those on organisms of the upper oceanic zone, coral reefs, and intertidal rocky shores. That on organisms of intertidal rocky shores is disproportionately long, which probably reflects accessibility and more active study of this marine area. The section on inshore pelagic organisms devotes 22 pages to the ecology (much of it more conservation than ecology) of commercial inshore fin fisheries; by contrast the section on sublittoral "bottom communities" reviews briefly principally Petersen's bottom community studies and entirely omits review of and reference to the substantial ecological literature on the various species of commercial oysters. Likewise no consideration is given to dominant forms like *Callinectes* which are equally active on the bottom and in the water. Combination of the sections on major habitats and organisms would have eliminated some duplication.

The book closes with a chapter of 8 pages entitled "Review." The author points out here (as well as in the "Introduction") that ". . . in the whole field of ecology, there are very few